



Complete Summary

GUIDELINE TITLE

Guidelines on the management of stable angina pectoris.

BIBLIOGRAPHIC SOURCE(S)

Fox K, Alonso Garcia MA, Ardissino D, Buszman P, Camici PG, Crea F, Daly C, DeBacker G, Hjemdahl P, Lopez-Sendon J, Marco J, Morais J, Pepper J, Sechtem U, Simoons M, Thygesen K. Guidelines on the management of stable angina pectoris. Sophia Antipolis, France: European Society of Cardiology; 2006. 63 p. [683 references]

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Management of stable angina pectoris. Recommendations of the Task Force of the European Society of Cardiology. Eur Heart J 1997 Mar;18(3):394-413.

** REGULATORY ALERT **

FDA WARNING/REGULATORY ALERT

Note from the National Guideline Clearinghouse: This guideline references a drug(s) for which important revised regulatory information has been released.

- [June 15, 2005, Non-Steroidal Anti-Inflammatory Drugs \(NSAIDs\)](#): U.S. Food and Drug Administration (FDA) recommended proposed labeling for both the prescription and over the counter (OTC) NSAIDs and a medication guide for the entire class of prescription products.
- [April 7, 2005, Non-steroidal Anti-Inflammatory Drugs \(NSAIDs\) \(prescription and OTC, including ibuprofen and naproxen\)](#): FDA asked manufacturers of prescription and non-prescription (OTC) non-steroidal anti-inflammatory drugs (NSAIDs) to revise their labeling to include more specific information about potential gastrointestinal (GI) and cardiovascular (CV) risks.

Additional Notices

- [October 18, 2007, PDE5 inhibitors, Viagra \(sildenafil citrate\), Levitra \(vardenafil HCL\), Cialis \(tadalafil\)](#): The PRECAUTION and updated Adverse Reactions Sections of the approved product labeling for Viagra, Levitra, and Cialis were revised in response to reports of sudden decreases or loss of hearing.

- [May 2, 2007, Antidepressant drugs](#): Update to the existing black box warning on the prescribing information on all antidepressant medications to include warnings about the increased risks of suicidal thinking and behavior in young adults ages 18 to 24 years old during the first one to two months of treatment.

COMPLETE SUMMARY CONTENT

** REGULATORY ALERT **

SCOPE

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INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT

CATEGORIES

IDENTIFYING INFORMATION AND AVAILABILITY

DISCLAIMER

SCOPE

DISEASE/CONDITION(S)

Stable angina pectoris

GUIDELINE CATEGORY

Diagnosis

Management

Treatment

CLINICAL SPECIALTY

Cardiology

INTENDED USERS

Advanced Practice Nurses

Nurses

Physician Assistants

Physicians

GUIDELINE OBJECTIVE(S)

To provide updated practical guidelines for the management of stable angina pectoris for use in clinical practice, as well as for epidemiological surveys and clinical trials

TARGET POPULATION

Patients with stable angina pectoris

INTERVENTIONS AND PRACTICES CONSIDERED

Diagnosis and Assessment

1. Laboratory tests
 - Noninvasive tests
 - Chest x-ray
 - Resting electrocardiogram [ECG]
 - Exercise ECG (stress test)
 - Stress testing in combination with imaging
 - Echocardiography at rest
 - Ambulatory ECG (Holter monitor)
 - Computed tomography (CT) angiography, including single positron emission computed tomography (SPECT)
 - Magnetic resonance arteriography (not recommended for routine clinical practice)
2. Invasive tests
 - Coronary arteriography
 - Intravascular ultrasound
 - Invasive assessment of functional severity of coronary lesions
3. Risk stratification (using clinical evaluation, stress testing, ventricular function, and coronary angiography)
4. Special diagnostic consideration in Syndrome X and vasospastic/variant angina

Treatment/Management

1. General management
 - Sublingual nitrate
 - Smoking cessation
 - Diet and alcohol control
 - Omega-3 fatty acids
 - Vitamins (not recommended)
 - Control of comorbid conditions (e.g., hypertension, diabetes)
 - Regulation of physical activity
 - Assessment of psychological factors
 - Advice on car driving, sexual intercourse (use of phosphodiesterase inhibitors), employment
2. Pharmacologic treatment
 - Low-dose aspirin
 - Cyclooxygenase (COX)-2 inhibitors (not recommended)
 - Nonsteroidal anti-inflammatory drugs
 - Thienopyridines (e.g., clopidogrel)
 - Proton-pump inhibitors for aspirin intolerance
 - Dipyridamole (not recommended for antithrombotic treatment in stable angina)
 - Lipid-lowering agents
 - Angiotensin converting enzyme (ACE) inhibitors

- Angiotensin receptor blockers (ARBs)
 - Hormone replacement therapy (not recommended)
 - Beta-blockers
 - Calcium channel blockers
 - Short-acting nitrates
 - Long-acting nitrates
 - Potassium channel openers
 - Other agents (e.g., metabolic agents)
3. Myocardial revascularization
- Coronary artery bypass grafting (CABG)
 - Percutaneous coronary intervention (PCI)
 - Elective stent insertion and drug-eluting stents
 - Special therapeutic considerations in cardiac Syndrome X and vasospastic angina

MAJOR OUTCOMES CONSIDERED

- Sensitivity and specificity of diagnostic tests
- Survival
- Symptom free survival
- Exercise capacity
- Incidence of myocardial infarction
- Reduction or stabilization of plaque progression
- Reduction in re-hospitalization rate

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Searches were performed of the following resources: PubMed, medicals journals by specialty, the Cochrane Library.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

- **Level of Evidence A:** Data derived from multiple randomized clinical trials or meta-analyses.

- **Level of Evidence B:** Data derived from a single randomized clinical trial or large non-randomized studies.
- **Level of Evidence C:** Consensus of opinion of the experts and/or small studies, retrospective studies, registries.

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Experts in the field carried out a comprehensive literature review with a view to making a critical evaluation of the use of diagnostic and therapeutic procedures and assessing the risk-benefit ratio of the therapies recommended for management and or prevention of the condition.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

This clinical scientific statement represents the consensus of a panel of experts appointed by the European Society of Cardiology (ESC). The writing group comprises cardiovascular specialists and pharmacologists and if necessary surgeons, each having extensive experience with stable angina pectoris. The panel focused largely on the management of this complex disease and derived prudent, practical, and contemporary treatment strategies for the many subgroups of patients comprising the broad stable angina pectoris disease spectrum.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

- **Class I:** Evidence and/or general agreement that a given treatment or procedure is beneficial, useful and effective
- **Class II:** Conflicting evidence and/or divergence of opinion about the usefulness/efficacy of the treatment or procedure
- **Class IIa:** weight of evidence/opinion is in favour of usefulness/efficacy
- **Class IIb:** Usefulness/efficacy is less well established by evidence/opinion
- **Class III*:** Evidence or general agreement that the treatment or procedure is not useful/effective and, in some cases, may be harmful

*Use of Class III evidence is discouraged by the European Society of Cardiology (ESC)

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Once the document was finalized and approved by all the experts involved in the Task Force, it was submitted to outside specialists for review. In some cases the document would be presented to a panel of key opinion leaders in Europe, specialists in the relevant condition at hand, for discussion and critical review. If necessary, the document was revised once more and, finally, approved by the European Society of Cardiology (ESC) Committee for Practice Guidelines (CPG) and selected members of the board of the ESC.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

The class of recommendations (I-III) and level of evidence (A-C) are defined at the end of the "Major Recommendations" field.

Definition and Pathophysiology of Stable Angina

Stable angina is a clinical syndrome characterized by discomfort in the chest, jaw, shoulder, back, or arms, typically elicited by exertion or emotional stress and relieved by rest or nitroglycerin. Less typically, discomfort may occur in the epigastric area. It is now usual to confine the term to cases in which the syndrome can be attributed to myocardial ischaemia.

Diagnosis and Assessment

Diagnosis and assessment of angina involve clinical assessment, laboratory tests, and specific cardiac investigations.

Symptoms and Signs

A careful history remains the cornerstone of the diagnosis of angina pectoris. In the majority of cases, it is possible to make a confident diagnosis on the basis of the history alone, although physical examination and objective tests are necessary to confirm the diagnosis and assess the severity of underlying disease. Definitions of typical and atypical angina are summarized in the table below titled "Clinical classification of chest pain."

Clinical Classification of Chest Pain	
Typical angina (definite)	Meets three of the following characteristics: <ul style="list-style-type: none">• Substernal chest discomfort of characteristic quality and duration• Provoked by exertion or emotional stress

Clinical Classification of Chest Pain	
	<ul style="list-style-type: none"> Relieved by rest and/or glyceryl trinitrate (GTN)
Atypical angina (probable)	Meets two of the above characteristics
Non-cardiac chest pain	Meets one or none of the above characteristics

It is important when taking the history to identify those patients with unstable angina, which may be associated with plaque rupture, who are at significantly higher risk of an acute coronary event in the short-term.

For patients with stable angina, it is also useful to classify the severity of symptoms using a grading system such as that of the Canadian Cardiovascular Society Classification (see Table 3 of the original guideline document). This is useful in determining the functional impairment of the patient and quantifying response to therapy.

Physical examination of a patient with (suspected) angina pectoris is important to assess the presence of hypertension, valvular heart disease, or hypertrophic obstructive cardiomyopathy. Physical examination should include assessment of body-mass index (BMI) and waist circumference to assist evaluation of the metabolic syndrome, evidence of non-coronary vascular disease which may be asymptomatic, and other signs of comorbid conditions. However, there are no specific signs in angina pectoris. During or immediately after an episode of myocardial ischaemia, a third or fourth heart sound may be heard and mitral insufficiency may also be apparent during ischaemia. Such signs are, however, elusive and non-specific.

Laboratory Tests

Recommendations for Laboratory Investigation in Initial Assessment of Stable Angina

Class I (in all patients)

1. Fasting lipid profile including total cholesterol (TC), low density lipoprotein (LDL), high density lipoprotein (HDL), and triglycerides (level of evidence **B**)
2. Fasting glucose (level of evidence **B**)
3. Full blood count including haemoglobin (Hb) and white cell count (level of evidence **B**)
4. Creatinine (level of evidence **C**)

Class I (if specifically indicated on the basis of clinical evaluation)

1. Markers of myocardial damage if evaluation suggests clinical instability or acute coronary syndromes (ACS) (level of evidence **A**)
2. Thyroid function if clinically indicated (level of evidence **C**)

Class IIa

1. Oral glucose tolerance test (level of evidence **B**)

Class IIb

1. High-sensitivity C-reactive protein (level of evidence **B**)
2. Lipoprotein a, apolipoprotein A (ApoA), and apolipoprotein B (ApoB) (level of evidence **B**)
3. Homocysteine (level of evidence **B**)
4. Glycosylated haemoglobin (HbA1c) (level of evidence **B**)
5. N-terminal brain natriuretic peptide NT-BNP (level of evidence **B**)

Recommendations for Blood Tests for Routine Reassessment in Patients with Chronic Stable Angina

Class IIa

1. Fasting lipid profile and fasting glucose on an annual basis (level of evidence **C**)

Chest X-ray

Recommendations for Chest X-ray (CXR) for Initial Diagnostic Assessment of Angina

Class I

1. CXR in patients with suspected heart failure (level of evidence **C**)
2. CXR in patients with clinical evidence of significant pulmonary disease (level of evidence **B**)

Non-invasive Cardiac Investigations

Resting Electrocardiogram (ECG)

Recommendations for Resting ECG for Initial Diagnostic Assessment of Angina

Class I (in all patients)

1. Resting ECG while pain free (level of evidence **C**)
2. Resting ECG during episode of pain (if possible) (level of evidence **B**)

Recommendations for Resting ECG for Routine Assessment in Patients with Chronic Stable Angina

Class IIb

1. Routine periodic ECG in the absence of clinical change (level of evidence **C**)

ECG Stress Testing

Recommendations for Exercise ECG for Initial Diagnostic Assessment of Angina

Class I

1. Patients with symptoms of angina and intermediate pre-test probability of coronary disease based on age, gender, and symptoms, unless unable to exercise or displays ECG changes which make ECG non-evaluative (level of evidence **B**)

Class IIb

1. Patients with ≥ 1 mm ST-depression on resting ECG or taking digoxin (level of evidence **B**)
2. In patients with low pre-test probability ($<10\%$ probability) of coronary disease based on age, gender, and symptoms (level of evidence **B**)

Reasons to Terminate the Exercise Stress Test:

- Symptom limitation (e.g. pain, fatigue, dyspnoea, and claudication)
- Combination of symptoms such as pain with significant ST-changes
- Safety reasons such as the following:
 - Marked ST-depression (>2 mm ST-depression can be taken as a relative indication for termination and ≥ 4 mm as an absolute indication to stop the test)
 - ST-elevation ≥ 1 mm
 - Significant arrhythmia
 - Sustained fall in systolic blood pressure >10 mm Hg
 - Marked hypertension (>250 mmHg systolic or >115 mmHg diastolic)
- Achievement of maximum predicted heart rate may also be a reason to terminate the test in patients with excellent exercise tolerance who are not tired and at the discretion of the supervising physician

Recommendations for Exercise ECG for Routine Re-Assessment in Patients with Chronic Stable Angina

Class IIb

1. Routine periodic exercise ECG in the absence of clinical change (level of evidence **C**)

Stress Testing in Combination with Imaging

A resting echocardiogram is acquired before a symptom-limited exercise test is performed. Tissue Doppler imaging allows regional quantification of myocardial motion (velocity), and strain and strain rate imaging allow determination of regional deformation.

Thallium-201 and technetium-99m radiopharmaceuticals are the most commonly used tracers.

Recommendations for the Use of Exercise Stress with Imaging Techniques (Either Echocardiography or Perfusion) in the Initial Diagnostic Assessment of Angina

Class I

1. Patients with resting ECG abnormalities, left bundle branch block (LBBB) >1mm ST-depression, paced rhythm, or Wolff-Parkinson-White (WPW) syndrome which prevent accurate interpretation of ECG changes during stress (level of evidence **B**)
2. Patients with a non-conclusive exercise ECG but reasonable exercise tolerance, who do not have a high probability of significant coronary disease and in whom the diagnosis is still in doubt (level of evidence **B**)

Class IIa

1. Patients with prior revascularization (percutaneous coronary intervention [PCI] or coronary artery bypass graft [CABG]) in whom localization of ischaemia is important (level of evidence **B**)
2. As an alternative to exercise ECG in patients where facilities, costs, and personnel resources allow (level of evidence **B**)
3. As an alternative to exercise ECG in patients with a low pre-test possibility of disease such as women with atypical chest pain (level of evidence **B**)
4. To assess functional severity of intermediate lesions on coronary arteriography (level of evidence **C**)
5. To localize ischaemia when planning revascularization options in patients who have already had arteriography (level of evidence **B**)

Recommendations for the Use of Pharmacological Stress with Imaging Techniques (Either Echocardiography or Perfusion) in the Initial Diagnostic Assessment of Angina

Class I, IIa and IIb indications as above if the patient is unable to exercise adequately.

Stress cardiac magnetic resonance (CMR) stress testing in conjunction with a dobutamine infusion can be used to detect wall motion abnormalities induced by ischaemia or perfusion abnormalities.

Echocardiography at Rest

Recommendations for Echocardiography for Initial Diagnostic Assessment of Angina

Class I

1. Patients with abnormal auscultation suggesting valvular heart disease or hypertrophic cardiomyopathy (level of evidence **B**)
2. Patients with suspected heart failure (level of evidence **B**)
3. Patients with prior myocardial infarction (MI) (level of evidence **B**)
4. Patients with LBBB, Q-waves, or other significant pathological changes on ECG, including ECG left ventricular hypertrophy (LVH) (level of evidence **C**)

Ambulatory ECG Monitoring

Recommendations for Ambulatory ECG for Initial Diagnostic Assessment of Angina

Class I

1. Angina with suspected arrhythmia (level of evidence **B**)

Class IIa

1. Suspected vasospastic angina (level of evidence **C**)

Non-invasive Techniques to Assess Coronary Calcification and Coronary Anatomy

Recommendations for the Use of Computed Tomography (CT) Angiography in Stable Angina

Class IIb

1. Patients with a low pre-test probability of disease, with a non-conclusive exercise ECG or stress imaging test (level of evidence **C**)

Magnetic Resonance Arteriography

At present, magnetic resonance arteriography can only be regarded as a valuable tool for research and is not recommended as routine clinical practice in the diagnostic evaluation of stable angina.

Invasive Techniques to Assess Coronary Anatomy

Recommendations for Coronary Arteriography for the Purposes of Establishing a Diagnosis in Stable Angina

Class I

1. Severe stable angina (Class 3 or greater of Canadian Cardiovascular Society Classification), with a high pre-test probability of disease, particularly if the symptoms are inadequately responding to medical treatment (level of evidence **B**)
2. Survivors of cardiac arrest (level of evidence **B**)
3. Patients with serious ventricular arrhythmias (level of evidence **C**)
4. Patients previously treated by myocardial revascularization (PCI, CABG) who develop early recurrence of moderate or severe angina pectoris (level of evidence **C**)

Class IIa

1. Patients with an inconclusive diagnosis on non-invasive testing, or conflicting results from different non-invasive modalities at intermediate to high risk of coronary disease (level of evidence **C**)

2. Patients with a high risk of restenosis after PCI, if PCI has been performed in a prognostically important site (level of evidence **C**)

Risk Stratification

The clinical evaluation, the response to stress testing, the quantification of ventricular function, and the extent of coronary artery disease (CAD), are the four key pieces of information to stratify patient's risk. However, not all patients will require invasive assessment of the coronary anatomy, particularly if their clinical evaluation and non-invasive testing establish that they are in a low-risk group. The risk assessment hierarchy can be described as:

1. Risk stratification by clinical evaluation
2. Risk stratification by response to stress testing
3. Risk stratification by ventricular function
4. Risk stratification by coronary anatomy

Risk stratification generally follows a pyramidal structure, with all patients requiring risk stratification by clinical evaluation as the most basic requirement, proceeding in the majority to non-invasive assessment of ischaemia and ventricular function, and finally coronary arteriography in a selected proportion. A summary of the recommendations for the routine use of investigations in evaluation of stable angina with corresponding levels of evidence related to diagnosis and prognosis, is presented in **Table 2**.

Table 2: Summary of recommendations for routine non-invasive investigations in evaluation of stable angina

Test	For Diagnosis		For Prognosis	
	Class of Recommendation	Level of Evidence	Class of Recommendation	Level of Evidence
Laboratory tests				
Full blood count, creatinine	I	C	I	B
Fasting glucose	I	B	I	B
Fasting lipid profile	I	B	I	B
Hs-C-reactive protein, homocysteine, Ip(a), ApoA, and ApoB	IIb	B	IIb	B
ECG				
Initial evaluation	I	C	I	B
During episode of angina	I	B		

Routine periodic ECG on successive visits	IIb	C	IIb	C
Ambulatory ECG monitoring				
Suspected arrhythmia	I	B		
Suspected vasospastic angina	IIa	C		
In suspected angina with normal exercise test	IIa	C		
Chest X-ray				
Suspected heart failure or abnormal cardiac auscultation	I	B	I	B
Suspected significant pulmonary disease	I	B		
Echocardiogram				
Suspected heart failure, abnormal auscultation, abnormal ECG, Q waves, BBB and marked ST changes	I	B	I	B
Previous MI			I	B
Hypertension or diabetes mellitus	I	C	I	B/C
Intermediate or low-risk patient not due to have alternative assessment of LV function			IIa	C
Exercise ECG				
First line for	I	B	I	B

initial evaluation, unless unable to exercise/ECG not evaluable				
Patients with known CAD and significant deterioration in symptoms			I	B
Routine periodic testing once angina controlled	IIb	C	IIb	C
Exercise imaging technique (echo or radionuclide)				
Initial evaluation in patients with uninterpretable ECG	I	B	I	B
Patients with non-conclusive exercise test (but adequate exercise tolerance)	I	B	I	B
Angina post-revascularization	IIa	B	IIa	B
To identify location of ischaemia in planning revascularization	IIa	B		
Assessment of functional severity of intermediate lesions on arteriography	IIa	C		
Pharmacological stress imaging technique				
Patients unable to exercise	I	B	I	B
Patients with non-conclusive exercise test due to poor exercise	I	B	I	B

tolerance				
To evaluate myocardial viability	IIa	B		
Other indications as for exercise imaging where local facilities favour pharmacological rather than exercise stress	IIa	B	IIa	B
Non-invasive CT arteriography				
Patients with low probability of disease and non-conclusive or positive stress test	IIb	C		

Risk Stratification Using Clinical Evaluation

The relation of typical angina to prognosis is mediated by its relation to the extent of coronary disease. But the pattern of angina occurrence, angina frequency, and resting ECG abnormalities are independent predictors of survival and survival free MI, and may be combined in a simple weighted score to predict outcome, particularly in the first year after assessment (Figure 3 in the original guideline document). The effect of angina score on prognosis is not apparent after 3 years and is greatest when ventricular function is maintained.

Recommendations for Risk Stratification by Clinical Evaluation, Including ECG and Laboratory Tests in Stable Angina

Class I

1. Detailed clinical history and physical examination including BMI and/or waist circumference in all patients, also including a full description of symptoms, quantification of functional impairment, past medical history, and cardiovascular risk profile (level of evidence **B**)
2. Resting ECG in all patients (level of evidence **B**)

Risk Stratification Using Stress Testing

Recommendations for Risk Stratification According to Exercise Stress ECG in Stable Angina in Patients Who Can Exercise

Class I

1. All patients without significant resting ECG abnormalities undergoing initial evaluation (level of evidence **B**)
2. Patients with stable coronary disease after a significant change in symptom level (level of evidence **C**)

Class IIa

1. Patients post-revascularization with a significant deterioration in symptomatic status (level of evidence **B**)

Recommendations for Risk Stratification According to Exercise Stress Imaging (Perfusion or Echocardiography) in Stable Angina in Patients Who Can Exercise

Class I

1. Patients with resting ECG abnormalities, LBBB, >1 mm ST-depression, paced rhythm, or WPW which prevent accurate interpretation of ECG changes during stress (level of evidence **C**)
2. Patients with a non-conclusive exercise ECG, but intermediate or high probability of disease (level of evidence **B**)

Class IIa

1. In patients with a deterioration in symptoms post-revascularization (level of evidence **B**)
2. As an alternative to exercise ECG in patients where facilities, cost, and personnel resources allow (level of evidence **B**)

Recommendations for Risk Stratification According to Pharmacological Stress Imaging (Perfusion or Echocardiography) in Stable Angina

Class I

1. Patients who cannot exercise

Other class I and II indications as for exercise stress imaging (perfusion or echocardiography) in stable angina in patients who can exercise, but where local facilities do not include exercise imaging.

Risk Stratification Using Ventricular Function

Recommendations for Risk Stratification by Echocardiographic Evaluation of Ventricular Function in Stable Angina

Class I

1. Resting echocardiography in patients with prior MI symptoms or signs of heart failure, or resting ECG abnormalities (level of evidence **B**)
2. Resting echocardiography in patients with hypertension (level of evidence **B**)
3. Resting echocardiography in patients with diabetes (level of evidence **C**)

Class IIa

1. Resting echocardiography in patients with a normal resting ECG without prior MI who are not otherwise to be considered for coronary arteriography (level of evidence **C**)

Risk Stratification Using Coronary Arteriography

Recommendations for Risk Stratification by Coronary Arteriography in Patients with Stable Angina

Class I

1. Patients determined to be at high risk for adverse outcome on the basis of non-invasive testing even if they present with mild or moderate symptoms of angina (level of evidence **B**)
2. Severe stable angina (Class 3 of Canadian Cardiovascular Society Classification [CCS]), particularly if the symptoms are inadequately responding to medical treatment (level of evidence **B**)
3. Stable angina in patients who are being considered for major non-cardiac surgery, especially vascular surgery (repair of aortic aneurysm, femoral bypass, carotid endarterectomy) with intermediate or high risk features on non-invasive testing (level of evidence **B**)

Class IIa

1. Patients with an inconclusive diagnosis on non-invasive testing, or conflicting results from different non-invasive modalities (level of evidence **C**)
2. Patients with a high risk of restenosis after PCI if PCI has been performed in a prognostically important site (level of evidence **C**)

Special Diagnostic Considerations: Angina with 'Normal' Coronary Arteries

A considerable proportion of patients, especially women, who undergo coronary arteriography because of symptoms of chest pain do not have significant CAD. In these patients, the features of chest pain may suggest one of the following three possibilities.

- Pain involves a small portion of the left hemithorax, lasts for several hours or even days, is not relieved by nitroglycerin, and may be provoked by palpation (non-anginal pain, often musculoskeletal in origin).
- Pain has typical features of angina in terms of location and duration but occurs predominately at rest (atypical angina, which may be due to coronary spasm vasospastic angina)
- Angina with mostly typical features (although duration may be prolonged, and relation to exercise somewhat inconsistent) associated with abnormal results of stress tests (cardiac Syndrome X)

Syndrome X

Although there is no universally accepted definition of Syndrome X, to fulfill the classical description of 'Syndrome X' requires the presence of the triad of:

1. Typical exercise-induced angina (with or without additional resting angina and dyspnoea)
2. Positive exercise stress ECG or other stress imaging modality
3. Normal coronary arteries

Recommendations for Investigation in Patients with Classical Triad of Syndrome X

Class I

1. Resting echocardiogram in patients with angina and normal or non-obstructed coronary arteries to assess for presence of ventricular hypertrophy and/or diastolic dysfunction (level of evidence **C**)

Class IIb

1. Intracoronary acetylcholine during coronary arteriography, if the arteriogram is visually normal, to assess endothelium-dependent coronary flow reserve, and exclude vasospasm (level of evidence **C**)
2. Intracoronary ultrasound, coronary flow reserve, or fractional flow reserve (FFR) measurement to exclude missed obstructive lesions, if angiographic appearances are suggestive of a non-obstructive lesion rather than completely normal, and stress imaging techniques identify an extensive area of ischaemia (level of evidence **C**)

Vasospastic/Variant Angina

Recommendations for Diagnostic Tests in Suspected Vasospastic Angina

Class I

1. ECG during angina if possible (level of evidence **B**)
2. Coronary arteriography in patients with characteristic episodic chest pain and ST-segment changes that resolve with nitrates and/or calcium antagonists to determine the extent of underlying coronary disease (level of evidence **B**)

Class IIa

1. Intracoronary provocative testing to identify coronary spasm in patients with normal findings or non-obstructive lesions on coronary arteriography and the clinical picture of coronary spasm (level of evidence **B**)
2. Ambulatory ST-segment monitoring to identify ST-deviation (level of evidence **C**)

Treatment

General Management

Patients and their close associates should be informed of the nature of angina pectoris, and the implications of the diagnosis and the treatments that may be recommended. The patient can be reassured that, in most cases, both the symptoms of angina and prognosis can be improved with proper management. Comprehensive risk stratification should be conducted as outlined above, and particular attention should be paid to the elements of lifestyle that could have contributed to the condition and which may influence prognosis, including physical activity, smoking, and dietary habits. The recommendations of the Third Joint European Societies' Task Force on Cardiovascular Disease Prevention in Clinical Practice should be followed.

Treatment of the Acute Attack

Patients should be advised to rest, at least briefly, from the activity which provoked the angina and advised regarding the use of sublingual nitrate for acute relief of symptoms. It is also useful to warn the patient of the need to protect against potential hypotension by sitting on the first number of occasions when taking sublingual nitrate and also other possible side-effects, particularly headache. The use of prophylactic nitrate to prevent predictable episodes of angina in response to exertion can be encouraged. Patients should be informed of the need to seek medical advice if angina persists for >10-20 minutes after resting and/or is not relieved by sublingual nitrate.

All preventive measures, pharmacological and non-pharmacological, described in this document apply similarly to men and women, even if there is less documentation of health benefits among female compared with male patients with stable angina pectoris and the clinical presentation of the disease may differ between genders. Risk factors, clinical presentation, and the level of risk for serious cardiovascular complications should determine the need for preventive and therapeutic interventions, rather than the gender of the patient. Recommendations concerning hormone replacement therapy have changed and are commented upon subsequently.

Smoking

Cigarette smoking should be strongly discouraged. Nicotine replacement therapy has proved effective and safe.

Diet and Alcohol

Dietary interventions are effective in the prevention of events in patients with established CAD, when properly implemented. Certain food types are to be encouraged such as fruit, vegetables, cereal, and grain products as well as skimmed dairy products, fish, and lean meat, many of which are major components of the Mediterranean diet. Patients should thus be encouraged to adopt a 'Mediterranean' diet, with vegetables, fruit, fish, and poultry being the mainstays. The intensity of change needed in the diet may be guided by the total and LDL cholesterol levels and other lipid abnormalities. Those who are overweight should be put on a weight reducing diet.

Alcohol in moderation may be beneficial, but excessive consumption is harmful, especially in patients with hypertension or heart failure. It has been difficult to

develop public health recommendations on safe limits of alcohol use, but moderate alcohol consumption should not be discouraged.

Omega-3 Fatty Acids

Fish oils rich in omega-3 fatty acids (n-3 polyunsaturated fatty acids) are useful in the reduction of hypertriglyceridaemia. Patients with stable angina without high risk features should rarely be considered for omega-3 fatty acid supplementation. Dietary intervention to achieve fish consumption at least once weekly can, however, be more widely recommended.

Vitamins and Antioxidants

Vitamin supplementation has not been shown to reduce cardiovascular risk in patients with CAD.

Hypertension, Diabetes, and Other Disorders

Concomitant disorders should be managed appropriately. Particular attention should be given to control of elevated blood pressure, diabetes mellitus, and other features of the metabolic syndrome which increase the risk of progression of coronary disease. Of particular note, the Task Force report on cardiovascular disease (CVD) prevention suggests considering a lower threshold for institution of pharmacological therapy for hypertension (130/85) for patients with established coronary heart disease (CHD) (which would include patients with angina and non-invasive or invasive confirmation of coronary disease). Patients with concomitant diabetes and/or renal disease should be treated with a blood pressure goal of <130/80 mm Hg. Diabetes is a strong risk factor for cardiovascular complications and should be managed carefully with good glycaemic control and attention to other risk factors.

Anaemia or hyperthyroidism, if present, should be corrected.

Physical Activity

Physical activity within the patient's limitations should be encouraged, as it may increase exercise tolerance, reduce symptoms, and has favourable effects on weight, blood lipids, blood pressure, glucose tolerance, and insulin sensitivity. Advice on exercise must take into account the individual's overall fitness and the severity of symptoms. An exercise test can act as a guide to the level at which an exercise programme can be initiated. Detailed recommendations on exercise prescription and on recreational and vocational activities are provided by the ESC Working Group on Cardiac Rehabilitation.

Psychological Factors

Although the role of stress in the genesis of CAD is controversial, there is no doubt that psychological factors are important in provoking attacks of angina. Furthermore, the diagnosis of angina often leads to excessive anxiety. Reasonable reassurance is essential, and patients may benefit from relaxation techniques and other methods of stress control.

Car Driving

In most countries, patients with stable angina are permitted to drive except for commercial public transport or heavy vehicles. Stressful driving conditions should be avoided.

Sexual Intercourse

Sexual intercourse may trigger angina. Common sense will dictate that this should not be too physically or emotionally demanding. Nitroglycerin prior to intercourse may be helpful. Phosphodiesterase (PGE5) inhibitors such as sildenafil, tadalafil, and vardenafil, used in the treatment of erectile dysfunction, may bestow benefits in terms of exercise duration and can be safely prescribed to men with CAD but should not be used in those receiving long-acting nitrates. The patient must be informed about the potentially harmful interactions between PGE5 inhibitors and nitrates or NO (nitric oxide) donors.

Employment

An assessment should always be made of the physical and psychological factors involved in an affected subject's work (including housework). Patients should, if possible, be encouraged to continue in their occupation, with appropriate modifications, if necessary.

Pharmacological Treatment of Stable Angina Pectoris

Pharmacological Therapy to Improve Prognosis

Co-existing disorders such as diabetes and/or hypertension in patients with stable angina should be well controlled, dyslipidaemia should be corrected, and smoking cessation attempted (without or with pharmacological support). Statin and angiotensin-converting enzyme (ACE)-inhibitor treatment may provide protection above that which can be ascribed to their lipid and blood pressure lowering effects, respectively, and are discussed separately. In addition, antiplatelet treatment should always be considered for patients with ischaemic heart disease. Levels of evidence based on prognosis and symptom relief are provided for the recommended treatments for angina in the treatment algorithm illustrated in *Figure 7* in the original guideline document.

If non-steroidal anti-inflammatory drugs (NSAIDs) are needed, they should be used in the lowest effective doses and for the shortest possible duration. NSAID treatment should, when this is indicated for other reasons, be combined with low-dose aspirin to assure effective platelet inhibition in patients with stable angina pectoris. In such circumstances, ibuprofen should be avoided, as this NSAID prevents aspirin from irreversibly acetylating the COX-1 enzyme of platelets, as may naproxen.

Recommendations for Pharmacological Therapy to Improve Prognosis in Patients with Stable Angina

Class I

1. Aspirin 75 mg daily in all patients without specific contradictions (i.e. active gastrointestinal [GI] bleeding, aspirin allergy, or previous aspirin intolerance) (level of evidence **A**)
2. Statin therapy for all patients with coronary disease (level of evidence **A**)
3. ACE-inhibitor therapy in patients with coincident indications for ACE-inhibition, such as hypertension, heart failure, LV dysfunction, prior MI with LV dysfunction, or diabetes (level of evidence **A**)
4. Oral beta-blocker therapy in patients post-MI or with heart failure (level of evidence **A**)

Class IIa

1. ACE-inhibitor therapy in all patients with angina and proven coronary disease (level of evidence **B**)
2. Clopidogrel as an alternative antiplatelet agent in patients with stable angina who cannot take aspirin (e.g. aspirin allergic) (level of evidence **B**)
3. High dose statin therapy in high-risk (>2% annual CV mortality) patients with proven coronary disease (level of evidence **B**)

Class IIb

1. Fibrate therapy in patients with low HDL and high triglycerides who have diabetes or the metabolic syndrome (level of evidence **B**)
2. Fibrate or nicotinic acid as adjunctive therapy to statin in patients with low HDL and high triglycerides at high risk (>2% annual CV mortality) (level of evidence **C**)

Pharmacological Treatment of Symptoms and Ischaemia

Anti-anginal drug treatment should be tailored to the needs of the individual patient, and should be monitored individually.

The dosing of one drug should be optimized before adding another one, and it is advisable to switch drug combinations before attempting a three drug regimen. Poor adherence is always a factor to consider when drug therapy is unsuccessful.

An algorithm depicting the strategy for medical management of stable angina, if revascularization is not considered necessary after initial evaluation and risk stratification, includes treatments aimed at improving prognosis and symptoms and is shown in *Figure 7* in the original guideline document. The following recommendations pertain to anti-anginal therapy and the level of evidence refers to anti-anginal or anti-ischaemic efficacy unless stated otherwise.

Recommendations for Pharmacological Therapy to Improve Symptoms and/or Reduce Ischaemia in Patients with Stable Angina

Class I

1. Provide short-acting nitroglycerin for acute symptom relief and situational prophylaxis, with appropriate instructions on how to use the treatment (level of evidence **B**)

2. Test the effects of a beta-1 blocker, and titrate to full dose; consider the need for 24 hour protection against ischaemia (level of evidence **A**)
3. In case of beta-blocker intolerance or poor efficacy attempt monotherapy with a calcium channel blocker (CCB) (level of evidence **A**), long-acting nitrate (level of evidence **C**), or nicorandil (level of evidence **C**)
4. If the effects of beta-blocker monotherapy are insufficient, add a dihydropyridine CCB (level of evidence **B**)

Class IIa

1. In case of beta-blocker intolerance try sinus node inhibitor (level of evidence **B**)
2. If CCB monotherapy or combination therapy (CCB with beta-blocker) is unsuccessful, substitute the CCB with a long-acting nitrate or nicorandil. Be careful to avoid nitrate tolerance (level of evidence **C**)

Class IIb

1. Metabolic agents may be used, where available, as add-on therapy, or as substitution therapy when conventional drugs are not tolerated (level of evidence **B**)

Consider triple therapy only if optimal two drug regimens are insufficient, and evaluate the effects of additional drugs carefully. Patients whose symptoms are poorly controlled on double therapy should be assessed for suitability for revascularization, as should those who express a strong preference for revascularization rather than pharmacological therapy. The ongoing need for medication to improve prognosis irrespective of revascularization status, and the balance of risk and benefit on an individual basis, should be explained in detail.

Special Therapeutic Considerations: Cardiac Syndrome X and Vasospastic Angina

Treatment of Syndrome X

Recommendations for Pharmacological Therapy to Improve Symptoms in Patients with Syndrome X

Class I

1. Therapy with nitrates, beta-blockers, and calcium antagonists alone or in combination (level of evidence **B**)
2. Statin therapy in patients with hyperlipidaemia (level of evidence **B**)
3. ACE inhibition in patients with hypertension (level of evidence **C**)

Class IIa

1. Trial of therapy with other anti-anginals including nicorandil and metabolic agents (level of evidence **C**)

Class IIb

1. Aminophylline for continued pain, despite Class I measures (level of evidence **C**)
2. Imipramine for continued pain, despite Class I measures (level of evidence **C**)

Treatment of Vasospastic Angina

Recommendations for Pharmacological Therapy of Vasospastic Angina

Class I

1. Treatment with calcium antagonists and if necessary nitrates in patients whose coronary arteriogram is normal or shows only non-obstructive lesions (level of evidence **B**)

Myocardial Revascularization

There are two well-established approaches to revascularization for treatment of chronic stable angina caused by coronary atherosclerosis: surgical revascularization, coronary artery bypass graft (CABG), and percutaneous coronary intervention (PCI). The individual risk of the patient as well as symptomatic status must be a major factor in the decision-making process.

Indications for Revascularization

In general, patients who have indications for coronary arteriography and in whom catheterization reveals severe coronary artery stenosis are also potential candidates for myocardial revascularization. In addition, a patient is potentially eligible for revascularization if:

1. medical therapy is unsuccessful in controlling symptoms to the patient's satisfaction
2. non-invasive tests reveal a substantial area of myocardium at risk
3. there is a high likelihood of success and acceptable risk of morbidity and mortality
4. the patient prefers an interventional rather than a medical approach and is fully informed of the risks of this route of therapy in their individual case

An adequate response to therapy must be judged in consultation with the patient. For some, Class I symptoms (angina only on strenuous exertion but not during ordinary activity) are acceptable, but others may wish for complete abolition of their symptoms. Recommendations for revascularization on symptomatic grounds, as summarized in the table below, have taken into account the range of symptomatic grades for which evidence is available and should be construed in this fashion rather than as a directive to perform revascularization across the entire range of symptomatology. What is an acceptable risk of morbidity and mortality should also be considered on an individual basis for each patient. Ideally, patients should not be advised to have a procedure for which the procedural mortality exceeds their estimated annual mortality unless there is evidence of substantial prognostic benefit in the longer term or symptoms are having a serious impact on their quality of life, despite appropriate medical therapy.

Selection of the method of revascularization should be based on:

1. Risk of peri-procedural morbidity and mortality
2. Likelihood of success, including factors such as technical suitability of lesions for angioplasty or surgical bypass
3. Risk of restenosis or graft occlusion
4. Completeness of revascularization. If considering PCI for multi-vessel disease, is there a high probability that PCI will provide complete revascularization or at least in the same range as CABG?
5. Diabetic status
6. Local hospital experience in cardiac surgery and interventional cardiology
7. Patient's preference

Contradictions to myocardial revascularization comprise the following:

1. Patients with one- or two-vessel CAD without significant proximal left anterior descending artery (LAD) stenosis who have mild or no symptoms and have not received an adequate trial of medical therapy or have no demonstrable ischaemia or only a limited area of ischaemia/viability on non-invasive testing
2. Borderline (50-70%) coronary stenosis in location other than LM and no demonstrable ischaemia on non-invasive testing
3. Non-significant (<50%) coronary stenosis
4. High risk of procedure-related morbidity or mortality (>10-15% mortality risk) unless the risk of the procedure is balanced by an expected significant improvement in survival or the patient's quality of life without the procedure is extremely poor

Summary of recommendations for revascularization in stable angina				
Indication	For Prognosis^a		For Symptoms^b	
	Class of Recommendation	Level of Evidence	Class of Recommendation	Level of Evidence
PCI (assuming suitable anatomy for PCI, appropriate risk stratification, and discussion with the patient)				
Angina CCS classes I-IV despite medical therapy with one-vessel disease		I		A
Angina CCS classes I-IV despite medical therapy with multi-vessel disease (non-diabetic)		I		A

Stable angina with minimal (CCS class I) symptoms on medication and one-, two-, or three-vessel disease but objective evidence of large ischaemia	IIb	C		
CABG (assuming suitable anatomy for surgery, appropriate risk stratification, and discussion with the patient)				
Angina and LM stem disease	I	A	I	A
Angina and three-vessel disease with objective large ischaemia	I	A	I	A
Angina and three-vessel disease with poor ventricular function	I	A	I	A
Angina with two- or three-vessel disease including severe disease of the proximal LAD	I	A	I	A
Angina CCS classes I-IV with multi-vessel disease (diabetic)	IIa	B	I	B
Angina CCS classes I-IV with multi-vessel disease (non-diabetic)			I	A
Angina CCS classes I-IV despite medical			I	B

therapy and
one-vessel
disease
including
severe disease
of the proximal
LAD

Angina CCS
classes I-IV
despite
medical
therapy and
one-vessel
disease not
including
severe disease
of the proximal
LAD

I Ib

B

Angina with
minimal (CCS
class I)
symptoms on
medication and
one-, two-, or
three-vessel
disease but
objective
evidence of
large
ischaemia

I Ib

C

Recommendations for revascularization on symptomatic grounds take into account the range of symptomatic grades for which evidence is available and should be construed in this fashion rather than as a directive to perform revascularization across the entire range of symptomatology.

CCS, Canadian Cardiovascular Society.

^aRelates to effects on mortality, cardiac or cardiovascular mortality, or mortality combined with MI.

^bRelates to changes in angina class, exercise duration, time to angina on treadmill testing, repeat hospitalization for angina, or other parameters of functional capacity or quality of life.

Recommendations for Revascularization to Improve Prognosis in Patients with Stable Angina

Class I

1. CABG for significant left main (LM) CAD or its equivalent (i.e. severe stenosis of ostial/proximal segment of left descending and circumflex coronary arteries) (level of evidence **A**)

2. CABG for significant proximal stenosis of three major vessels, particularly in those patients with abnormal LV function or with early or extensive reversible ischaemia on functional testing (level of evidence **A**)
3. CABG for one- or two-vessel disease with high-grade stenosis of proximal left anterior descending artery (LAD) with reversible ischaemia on non-invasive testing (level of evidence **A**)
4. CABG for significant disease with impaired LV function and viability demonstrated by non-invasive testing (level of evidence **B**)

Class IIa

1. CABG for one- or two-vessel CAD without significant proximal LAD stenosis in patients who have survived sudden cardiac death or sustained ventricular tachycardia (level of evidence **B**)
2. CABG for significant three-vessel disease in diabetics with reversible ischaemia on functional testing (level of evidence **C**)
3. PCI for CABG for patients with reversible ischaemia on functional testing and evidence of frequent episodes of ischaemia during daily activities (level of evidence **C**)

Recommendations for Revascularization to Improve Symptoms in Patients with Stable Angina

Class I

1. CABG for multi-vessel disease technically suitable for surgical revascularization in patients with moderate-to-severe symptoms not controlled by medical therapy, in whom risks of surgery do not outweigh potential benefits (level of evidence **A**)
2. PCI for one-vessel disease technically suitable for percutaneous revascularization in patients with moderate-to-severe symptoms not controlled by medical therapy, in whom procedural risks do not outweigh potential benefits (level of evidence **A**)
3. PCI for multi-vessel disease without high-risk coronary anatomy, technically suitable for percutaneous revascularization in patients with moderate-to-severe symptoms not controlled by medical therapy, in whom procedural risks do not outweigh potential benefits (level of evidence **A**)

Class IIa

1. PCI for one-vessel disease technically suitable for percutaneous revascularization in patients with mild-to-moderate symptoms which are nonetheless unacceptable to the patient, in whom procedural risks do not outweigh potential benefits (level of evidence **A**)
2. CABG for one-vessel disease technically suitable for surgical revascularization in patients with moderate-to-severe symptoms not controlled by medical therapy, in whom operative risk does not outweigh potential benefit (level of evidence **A**)
3. CABG for multi-vessel disease technically suitable for surgical revascularization in patients with mild-to-moderate symptoms which are nonetheless unacceptable to the patient, in whom operative risk does not outweigh potential benefit (level of evidence **A**)

4. PCI for multi-vessel disease technically suitable for percutaneous revascularization in patients with mild-to-moderate symptoms which are nonetheless unacceptable to the patient, in whom procedural risks do not outweigh potential benefits (level of evidence **A**)

Class IIb

1. CABG for one-vessel disease technically suitable for surgical revascularization in patients with mild-to-moderate symptoms which are nonetheless unacceptable to the patient, in whom operative risk is not greater than the estimated annual mortality (level of evidence **B**)

Treatment of Stable Angina: Multi-targeted Treatment of a Multi-faceted Disease

In his/her lifetime, the patient with stable angina may meet episodes of exercise/stress-induced symptomatic myocardial ischaemia (angina pectoris), silent ischaemia, progressive angina, acute coronary syndromes (unstable angina and MI), acute and chronic heart failure, and life-threatening arrhythmias. Prolonged periods of stability may alternate with periods of instability (sudden progression and acute coronary syndromes). According to the state of the disease, a patient will require treatment aimed at retardation of the progression of disease (prevention), management of symptomatic disease (angina pectoris), management of acute coronary syndromes, and management of heart failure or life-threatening arrhythmias. The physician should be prepared to offer the appropriate therapy at the appropriate time. The different modes of preventative therapy, symptomatic medical therapy, such as percutaneous and surgical coronary revascularization and management of arrhythmias, are all rapidly evolving and so it is recommended that an individual physician operates within a team which can offer the appropriate therapy at the appropriate time with the appropriate skills.

Special Subgroups

See the original guideline document for a discussion of stable angina pectoris in women, patients with diabetes mellitus, the elderly, and those with chronic refractory angina.

Conclusions and Recommendations

1. Angina pectoris due to coronary atherosclerosis is a common and disabling disorder. Although compatible with longevity, there is an increased risk of progression to MI and/or death. With proper management, the symptoms can usually be controlled and the prognosis substantially improved.
2. Every patient with suspected stable angina requires prompt and appropriate cardiological investigation to ensure that the diagnosis is correct and that the prognosis is evaluated. As a minimum, each patient should have a carefully taken history and physical examination, a comprehensive risk factor evaluation, and a resting ECG.
3. To confirm the diagnosis and plan further management, an initial non-invasive strategy, using exercise ECG, stress echo, or myocardial perfusion scintigraphy is most appropriate. This allows an assessment of the likelihood of and the severity of CHD in patients with mild-to-moderate symptoms and

- effective risk stratification. In many patients, coronary arteriography may follow, but an initial invasive strategy without prior functional testing is rarely indicated, and may only be considered for patients with new onset severe or uncontrolled symptoms.
4. The exercise ECG should be interpreted with attention to haemodynamic response, workload achieved, and clinical features of the individual as well as symptoms and ST-segment response. Alternative investigations are needed when exercise is not possible or the ECG is not interpretable, or in addition to exercise testing when the diagnosis remains uncertain or functional assessment is inadequate.
 5. In addition to their role in initial assessment of stable angina symptoms, myocardial perfusion scintigraphy and stress echocardiography are of particular value in demonstrating the extent and localization of myocardial ischaemia.
 6. Echocardiography and other non-invasive imaging modalities, such as magnetic resonance, are helpful in evaluating ventricular function.
 7. The interpretation of chest pain is particularly difficult in young and middle-aged women. The classical symptom complex of chronic stable angina, which is a reliable indicator of obstructive coronary disease in men, is not so in younger women. This problem is compounded by the higher prevalence of coronary artery spasm and 'Syndrome X' in women with chest pain and by the frequency of 'false-positive' exercise tests. However, these complexities should not prevent appropriate investigation and treatment of women, particularly the use of non-invasive investigations for the purposes of risk stratification and use of secondary preventative therapies.
 8. After initial risk evaluation, risk factor correction by life-style modification should be implemented in addition to pharmacological intervention as necessary. Strict diabetic control and weight control along with smoking cessation strategies are strongly advised in all patients with coronary disease, and blood pressure control is extremely important. Successful risk-factor management may modify the initial risk assessment.
 9. In terms of specific pharmacological therapy, short-acting nitrates, when tolerated, may be used to provide acute symptomatic relief. In the absence of contraindications or intolerance, patients with stable angina pectoris should be treated with aspirin (75 mg/day) and statin therapy. A beta-blocker should be used first line or, alternatively, a calcium-channel blocker or long-acting nitrate may be used to provide anti-anginal effects, as described earlier, with additional therapy as necessary. ACE-inhibition is indicated in patients with co-existing ventricular dysfunction, hypertension, or diabetes and should be strongly considered in patients with other high-risk features. Beta-blockers should be recommended in all post-MI patients and in patients with LV dysfunction, unless contraindicated.
 10. Anti-anginal drug treatment should be tailored to the needs of the individual patient and should be monitored individually. The dosing of one drug should be optimized before adding another one, and it is advisable to switch drug combinations before attempting a three drug regimen.
 11. If not undertaken for further prognostic evaluation, coronary arteriography should be undertaken when symptoms are not satisfactorily controlled by medical means, with a view to revascularization.
 12. PCI is an effective treatment for stable angina pectoris and is indicated for patients with angina not satisfactorily controlled by medical treatment when there are anatomically suitable lesions. Restenosis continues to be a problem, which has been diminished by advances in stenting technology. There is no

- evidence that PCI reduces the risk of death in patients with stable angina compared with medical or surgical therapy.
13. CABG is highly effective in relieving the symptoms of stable angina and reduces the risk of death over long-term follow-up in particular subgroups of patients, such as those with LM stem stenosis, proximal LAD stenosis, and three-vessel disease, especially if LV function is impaired.
 14. There is evidence that some gaps remain between best practice and usual care in the management of stable angina. Specifically, many individuals with stable angina are not referred for functional testing to confirm the diagnosis and determine prognosis. Furthermore, there is worrying variability in rates of prescription of statins and aspirin. Because of the wide variations in the quality of care afforded to sufferers from angina, there is a strong case for auditing several components of the management of the condition. As is the practice in some countries, local, regional, or national registers of the outcome of PCI and surgery should be created and maintained.

Definitions:

Class I: Evidence and/or general agreement that a given diagnostic procedure/treatment is beneficial, useful, and effective

Class II: Conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of the treatment or procedure

Class IIa: Weight of evidence/opinion is in favour of usefulness/efficacy

Class IIb: Usefulness/efficacy is less well established by evidence/opinion

Class III*: Evidence or general agreement that the treatment or procedure is not useful/effective and in some cases may be harmful.

*Use of Class III evidence is discouraged by the European Society of Cardiology (ESC)

Level of Evidence A: Data derived from multiple randomized clinical trials or meta-analyses

Level of Evidence B: Data derived from a single randomized clinical trial or large non-randomized studies

Level of Evidence C: Consensus of opinion of the experts and/or small studies, retrospective studies, registries

CLINICAL ALGORITHM(S)

The original guideline document contains clinical algorithms for:

- The initial evaluation of patients with clinical symptoms of angina
- The medical management of stable angina

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified and graded for selected recommendations (see "Major Recommendations").

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- Prevention of myocardial infarction and death
- Minimization or eradication of symptoms
- Improvement in Canadian Cardiac Society classification
- Identification of previously unidentified cardiovascular risk factors
- Identification of patients at highest risk, and therefore most likely to benefit from more aggressive treatment, early in the assessment of stable angina

POTENTIAL HARMS

Adverse effects and complications (including death) of diagnostic procedures, pharmacological therapy, and revascularizations procedures

CONTRAINDICATIONS

CONTRAINDICATIONS

- Coronary arteriography may be contraindicated for reasons of disability or serious comorbidity.
- Phosphodiesterase inhibitors should not be used in those receiving long-acting nitrates.
- Relative contraindications to beta-blockade include asthma, symptomatic peripheral vascular disease, and first-degree heart block.
- Aspirin is contraindicated in cases of active gastrointestinal bleeding, aspirin allergy, or previous aspirin intolerance.
- Contraindications to myocardial revascularization comprise the following:
 - Patients with one- or two-vessel cardiac artery disease (CAD) without significant approximal left anterior descending artery stenosis who have mild or no symptoms and have not received an adequate trial of medical therapy or have no demonstrable ischaemia or only a limited area of ischaemia/viability on non-invasive testing.
 - Borderline (50-70%) coronary stenosis in location other than left main disease and no demonstrable ischaemia on non-invasive testing.
 - Non-significant (<50%) coronary stenosis
 - High risk of procedure-related morbidity or mortality (>10-15% mortality risk) unless the risk of the procedure is balanced by an expected significant improvement in survival or the patient's quality of life without the procedure is extremely poor

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

The European Society of Cardiology (ESC) Guidelines represent the views of the ESC and were arrived at after careful consideration of the available evidence at the time they were written. Health professionals are encouraged to take them fully into account when exercising their clinical judgement. The guidelines do not, however, override the individual responsibility of health professionals to make appropriate decisions in the circumstances of the individual patients, in consultation with that patient, and where appropriate and necessary the patient's guardian or carer. It is also the health professional's responsibility to verify the rules and regulations applicable to drugs and devices at the time of prescription.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Clinical Algorithm
Personal Digital Assistant (PDA) Downloads
Pocket Guide/Reference Cards
Slide Presentation

For information about [availability](#), see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better
Living with Illness

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Fox K, Alonso Garcia MA, Ardissino D, Buszman P, Camici PG, Crea F, Daly C, DeBacker G, Hjelm Dahl P, Lopez-Sendon J, Marco J, Morais J, Pepper J, Sechtem U, Simoons M, Thygesen K. Guidelines on the management of stable angina

pectoris. Sophia Antipolis, France: European Society of Cardiology; 2006. 63 p.
[683 references]

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Not applicable: The guideline was not adapted from another source.

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

The Task Force members of the writing panels, as well as the document reviewers, are asked to provide disclosure statements of all relationships they may have, which might be perceived as real or potential conflicts of interest. These disclosure forms are kept on file at the European Heart House, headquarters of the European Society of Cardiology (ESC), and can be made available by written request to the ESC President. Any changes in conflict of interest that arise during the writing period must be notified to the ESC.

In compliance with the European Board for Accreditation in Cardiology (EBAC)/European Accreditation Council for Continuing Medical Education (EACCME) guidelines, all authors participating in this programme have disclosed potential conflicts of interest that might cause a bias in the article. The Organizing Committee is responsible for ensuring that all potential conflicts of interest relevant to the programme are declared to the participants prior to the Continuing Medical Education activities.

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Management of stable angina pectoris. Recommendations of the Task Force of the European Society of Cardiology. Eur Heart J 1997 Mar;18(3):394-413.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the [European Society of Cardiology \(ESC\) Web site](#).

Print copies: Available from Oxford University Press, Great Clarendon Street, Oxford, OX2 6DP, UK, Tel: +44 (0) 1865 353263, Fax: +44 (0) 1865 353774, Web site: <http://www.eurheartj.oxfordjournals.org/>.

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- Guidelines on the management of stable angina pectoris: executive summary. The Task Force on the Management of Stable Angina Pectoris of the European Society of Cardiology. Eur Heart J 2006;27:1341-1381. Electronic copies: Available in Portable Document Format (PDF) from the [European Society of Cardiology \(ESC\) Web site](#).
- Recommendations for guidelines production. A document for Task Force Members responsible for the production and updating of ESC guidelines. 2006 Jun 28. 21 p. Available in Portable Document Format (PDF) from the [ESC Web site](#).
- Stable angina pectoris. Pocket guidelines. European Society of Cardiology, 2006. Available from the [ESC Web site](#). Also available for PDA download from the [ESC Web site](#).
- Stable angina pectoris. Slide set. Available from the [ESC Web site](#).

Print copies: Available from Oxford University Press, Great Clarendon Street, Oxford, OX2 6DP, UK, Tel: +44 (0) 1865 353263, Fax: +44 (0) 1865 353774, Web site: <http://www.eurheartj.org/>.

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on August 23, 2006. The information was verified by the guideline developer on October 3, 2006. This summary was updated by ECRI Institute on November 6, 2007, following the updated U.S. Food and Drug Administration advisory on Viagra, Cialis, Levitra, and Revatio. This summary was updated by ECRI Institute on November 9, 2007, following the U.S. Food and Drug Administration advisory on Antidepressant drugs.

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